

STUD WALL CALCULATIONS

Stud Width (dy)	1.50 in
Stud Depth (dx)	5.50 in
Stud Length (L)	15.00 ft
Stud Spacing	16 in
Stud Species and Grade	2X6 DF No. 2
Top/Sill Plt. Species	HF

Design Values

Fb	900 psi
Fc	1350 psi
Fc _⊥	405 psi
E	1,600,000 psi
E _{min}	580,000 psi
CF _b	1.30
CF _c	1.10
A	8.25 in ²
S _x	7.56 in ³
I _x	20.80 in ⁴
Ct _c	1.00
CM _c	1.00
Ci _c	1.00

Load Case 1: Gravity Loads Only

ly (unbraced length)	1.0 ft
CD	1.15 (Snow Load)
(le/d)y	8.00
(le/d)x	32.73 (governs)
E' _{min}	580,000 psi
FcE	445.12 psi
Fc*	1707.75 psi
c	0.80 sawn lumber
FcE/Fc*	0.261
1 + FcE/Fc*/2c	0.788
Cp	0.245
Fc'	418.03 psi
fc	127.73 psi
CSI (axial)	0.31 OK

Bearing on Stud Wall Plates

lb	1.50 in
Cb	1.00 (conservative)
Fc _⊥ '	405.00 psi
fc _⊥	127.73 psi
CSI (bearing)	0.32 OK

Deflection

E'	1,600,000 psi
ΔWIND (.42C&C)*	1.02 in
L/d**	176 NG

*IBC 2015 Sec. 1604.3

**IRC 2015 Sec. 301.7

Vertical Loads

Wall LL (wLL)	423.5 plf
Wall DL (wDL)	366.85 plf
Wall DL (wTL)	790.35 plf
Trib. Length	1.33 ft
Pc	1053.80 lbs

Lateral Loads (Wind MWFRS)

Wind Load (windward wall)	38.72 psf
MWFRS Wind Load ASD	23.23 psf
Wind Atrib	20.00 ft ²
W	464.64 lbs
w	30.98 plf

Lateral Loads (Wind C&C)

Wind Load (Zone 4)	53.43 psf
CC Wind Load ASD	32.06 psf
W	641.16 lbs
w	42.74 plf

Load Case 2: Lateral Loads Only (Wind C&C)

Mmax	1202.18 ft-lbs
	14426.10 in-lbs
fbx	1907.58 psi

CSI (bending C&C) 0.90 OK

Load Case 3: Gravity Loads and Lateral Loads

CD	1.60 (Wind/Seismic)
Mmax	871.20 ft-lbs
	10454.40 in-lbs
CL	0.99
Cr	1.15 @ 16 O/C
Fbx'	2128.67 psi
fbx	1382.40 psi

CSI (bending MWFRS) 0.65 OK

Combined Stress

(re-evaluate compression values with CD = 1.6)

FcEx	445.12 psi
FcE	445.12 psi
Fc*	2376.00 psi
c	0.80 sawn lumber
FcE/Fc*	0.187
1 + FcE/Fc*/2c	0.742
Cp	0.179
Fc'	426.47 psi

$$\left(\frac{f_c}{F_c'}\right)^2 + \left(\frac{1}{1 - \frac{f_c}{F_{cEx}}}\right)\left(\frac{f_{bx}}{F_{bx}'}\right) = 0.77 \text{ OK}$$

Load Case: LC5

*LCMAX takes 100% of all loads for axial and bending.

Location: Wall A at Rear of Garage
 Specification: Use 2X6 DF No. 2 Grade @16" o/c